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ABSTRACT

A method of graphing multivariate data, called the star plot, is very useful in educational contexts because it provides teachers and guidance counselors with information not present in unsupplemented student achievement data. The utility of the method can be seen in analysis of data from a study of factors related to the problem-solving ability of 29 male and 34 female fifth grade students. In the study, students completed self-report questionnaires relating to their perceptions of competence, self-worth, anxiety, and motivational orientation in the classroom. Correlations between performance and self-perception measures disclosed a relationship between performance and reported perception of competence, but did not reveal whether a high achieving student enjoyed challenging schoolwork or lacked confidence, or whether a low achiever was debilitated by anxiety or merely uninterested. To depict the magnitude of each student's responses on the study's self-perception measures, star plots were constructed. The plots showed that some low achievers were not motivated by punishment or reward, some high achievers were not interested in school work, and some high achievers were anxious in the classroom. In addition to delineating general characteristics of the group, star plots indicate ways in which certain students fail to fit the general pattern, and thus suggest reasons for student classroom behavior. (RH)

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Student typologies as a means of characterizing individual differences among low and high achievers

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Often it seems as if the different agendas and different priorities of the educational researcher and educational practitioner result in our seeing the same problem from different perspectives. While our differences frequently lead us to frustration and conflict, they are in reality perceived rather than actual differences. In focusing on personal objectives and conflicts over turf--my research, my classroom--we fail to see what should be our common and primary purpose in education--to teach and to understand the individual child.

In my work in the schools as a research psychologist I've been struck by a tendency by both researchers and practitioners to BELIEVE the general tendencies and stereotypes used to characterize students. We see high achieving students as happy, confident, and interested in learning. We see low achieving students as lazy, unhappy, caring little about school. What we fail to see is the vast amount of individual variation among those performing at low levels and among those performing at high levels. In order to select appropriate interventions to maximize student learning we need to look more closely at the motivational patterns underlying student performance. We need to see beyond the general tendencies and stereotypes to the characteristics of individual students.

What I would like to show you today is a method of characterizing individual differences among students in terms of how they see themselves in the classroom. I will first show you the overall relations between student self-perceptions and performance. I will then show how student self-perceptions may be used to differentiate among types of students performing at low and at high levels. In displaying these student self-perception data I'm relying on a method of graphing multivariate data called the star plot. With the star plot you can look at general tendencies while simultaneously attending to individual differences. The information may be used by both guidance counselors and teachers to understand students in terms of their motivation and individual concerns and to develop learning environments which maximize students' motivation to learn.

Method

The data I will show you was collected in the context of a larger study on problem solving study. These data reflect the self-perceptions scores of an entire fifth grade within an elementary school with a varied socioeconmic makeup. The 29 male and 34 female fifth grade students at this school, completed self-report questionnaires relating to their perceptions of competence, self-worth, anxiety, and motivational orientation in

the classroom. All self-report relied on well established instruments. The scholastic and selfworth subscales of the Self-Perception Profile for Children (Harter, 1981). The Test Anxiety Scale for Children (Sarason, et al., 1960). And Harter's Measure of Motivation in the Classroom (in press; a new version of A Measure of Intrinsic versus Extrinsic Orientation in the Classroom, Harter, 1978). The Motivation in the Classroom Scale was used to assess students' self-reported intrinsic motivation to do schoolwork, e.g., I do my schoolwork because it's challenging, and extrinsic motivation, e.g., I do my schoolwork because I'll get in trouble with my parents if I don't. Students were also rated on their classroom performance by their teachers.

Results

This first Table (Table 1) shows the correlations between performance and the various measures of self-perception (i.e., self-worth, perceptions of competence, intrinsic motivational orientation, and anxiety). Student achievement is unrelated to self-worth, unrelated to student reported motivation and unrelated to self-reported anxiety. The only self-perception measure related to performance is students' reported perceptions of their competence. Although this relationship is significant ($r = .31$, $p < .05$), student' perceptions of their competence account for only 10% of the variance in in students' performance. Many students, performing at HIGH levels in the classroom DO NOT see themselves as competent. Many students performing at LOW levels in the classroom DO see themselves as competent.

Looking at student achievement alone, therefore, does not give one much information about the student (e.g., it is unrelated to self-worth, unrelated to anxiety, unrelated to motivational orientation). We do not know whether a high achieving student enjoys challenging schoolwork or lacks the confidence necessary to pursue a challenge. We do not know whether a low achiever is debilitated by anxiety or merely uninterested in schoolwork. There are, in fact, many types of high achievers and many types of low achievers who differ in terms of how they see their classroom experiences. These students may differ in the degree to which their performance actually reflects their potential to learn.

To differentiate "types" of students performing at high and low levels you can group them according whether their perceptions of their competence reflect their level of achievement. You can identify five groups of students, i.e., students who are characterized by (1) High Achievement - High Perceived Competence, (2) Low Achievement - Low Perceived Competence, (3) High Achievement - Low Perceived Competence, (4) Low Achievement - High Perceived Competence, and (5) Average Achievement - Average Perceived Competence. By adding this single dimension of self-perception to students' performance you can look at similar types of students who differ on a number of dimensions of self-perception and motivation.

The typologies of students, differing in both achievement and perceptions of competence, clearly differ in perceptions of self-worth, anxiety, and intrinsic motivation. Table 2 shows means for these groups on each measured variable. While self-worth and anxiety are related to perceptions of competence they are unrelated to achievement, both high and low achievers (Groups 1 and 3) report high self-worth and low feelings of anxiety in the classroom. Self-reported intrinsic motivation, however, is unrelated to either perceptions of competence or performance. Both underraters (High Achievement - Low Perceptions of Competence) and overraters (Low Achievers - High Perceptions of Competence) perceive little challenge or interest in their schoolwork. And, although the difference is not statistically significant, the low achievers with low perceptions of competence are the only students motivated by extrinsic sources of reward and punishment.

These typologies capture differences in self-perceptions and motivation missed when looking at student performance. Some low achievers are not motivated by punishment or reward. Some high achievers are not interested in schoolwork. A high achieving student may be anxious in the classroom.

Using this kind of information on students' self-perceptions can provide you with more information about the student and the student's motivation to learn than his/her level of performance alone. However, trying to understand these student differences and to use the information in a meanigful way can get complicated. To show how self-perception data may be used to characterize individuals differences and provide insight into the meaning of the student's perceptions I've taken advantage of a way of plotting a number of different perception scores for a student in one picture. Hopefully, these pictures tell the story one misses by looking at statistics and general relations. In fact, student patterns of perceptions allow you to look at general tendencies among students while maintaining perspective on the individual child.

This way of representing data is call a star plot. Let me just tell you a little bit about what a star plot can tell you. Then I will show you the plots for the type of low and high achieving students. A star plot, in this example (Figure 1) shows the magnitude of a student's responses on 5 different self-perception measures--self-worth, perceived competence, intrinsic motivation, extrinsic motivation, and anxiety. Each of these measures is represented by a single ray of the star. The longer the ray the higher the student's score on that measure. Students can be high on all measures low on all measures or any combination--making many differnt possible star configurations. The advantage of star plots as a way of communicating data is that it gives you more information about a student then you could get from knowing student's perceptions of competence or performance alone. That is, high perceptions of competence may mean one thing when reported by the student performing at a high level and may have a different meaning when reported by the student actually peforming at a low level. The two pieces of

information together provide information you cannot get from either piece alone.

For example, I've plotted here (Figure 2) the star plots for the two types of high achievers. High achievers who see themselves as competent and high achievers who do not see themselves as competent. You can see that these students differ in both their level of anxiety and their motivation. Teachers were actually unaware that a number of these high achievers lacked confidence in their abilities or experienced such high levels of anxiety.

The advantage of looking at profiles of students rather than group statistics is that while you can see the general characteristics of the group you are also able to see how certain students don't fit a general pattern. For example, while many in the high/high students are interested in schoolwork (high intrinsic motivation)--some are not. In fact Jared is characterized by teachers as variable in his classroom behavior--sometimes interested sometimes not. It is likely that he is unchallenged and bored by his schoolwork. To help Jared take advantage of his abilities he needs an environment he can find challenging. In contrast, Josip lacks confidence in his abilities despite his high performance. His high anxiety may result in his avoiding challenging situations--situations in which he does not feel he may succeed. He may need structured and a non-evaluative settings to maximize his potential.

There are also diferences among the low achievers (Figure 3). The low achievers who see themselves as competent tend to have high perceptions of their worth despite low levels of performance. They are relatively unanxious in the school setting and are not motivated by either intrinsic or extrinsic sources. These students believe they could do the work if they wanted they simple don't see a good reason to do it. Normal incentives and consequences in the classroom have little effect on their behavior--the reason is that these reinforcers have little value for these students. Teachers, in fact see these students as having the ability to do better work if they would just settle down and do it. These students may need learning experiences in which they see the reason or purpose to learn--this may mean tasks emphasizing utility value or personal interest rather than emphasize grading and performance.

Finally, we have the low achievers who see themselves as low achievers. Although there are exceptions, these students tend to have low perceptions of worth and high levels of anxiety in the classroom. Teachers see these students as having given up on school, frequently engaging in helpless types of behavior. These students may need remedial attention as well as help dealing with their anxiety and low perceptions of competence and worth and control. Possibly an environemt which maximizes students opportunities to develop their competencies without constant evaluation and comparison with others may stimulate these students to develop their competencies and may aide them in

developing perceptions of control over academic outcomes.

Discussion

The point of this demonstration is to show the insight into individual differences one may gain by assessing student self-perceptions. The value of this information lies in its usefulness as a tool aiding practitioners and researchers in seeing beyond student performance to understand reasons underlying student classroom behavior.

Teachers participating in this investigation were provided with data emphasizing individual differences among their students, including star plots (Chambers, et al., 1983) of students' scores across all measure in the study, graphs and figures documenting general tendencies. These data were used as a basis for (1) discussing observed relations, (2) using findings as a background to understand student scores, and (3) identifying students of concern to teachers and counselors. The teachers also used the graphic representations of student perceptions as a basis for a conference with sixth grade teachers for the following year. These teachers' use of research data demonstrates the value of student typologies. Student typologies provide a clear means of identifying and conveying information on individual differences and facilitate identifying individual needs.

To conclude: It seems as if in this day of ever increasing class size and departmentalize curriculum, the child is getting lost as we shuffle him or her from class to class. We teach the curriculum rather than the child. We report test scores rather than effects we are having on students' motivation to learn. In our focus on achievement we've lost the individual and the ability to adapt ourselves to individual needs. It is in attending to the individual that we in education reflect our respect for the individual. It is through our showing respect for the individual student that the student will learn to respect and value the educational process.

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TABLE 1

Correlations between student

self-perceptions and classroom performance

Student Self-Perception	Classroom Performance	Self-Worth	Perceived Competence	Intrinsic Motivation	Extrinsic Motivation
Self-Worth	.15				
Perceived Competence	.31*	.43*			
Intrinsic Motivation	.13	.28	.14		
Extrinsic Motivation	-.12	-.10	-.24	.20	
Anxiety	-.01	-.37*	-.38*	-.10	.14

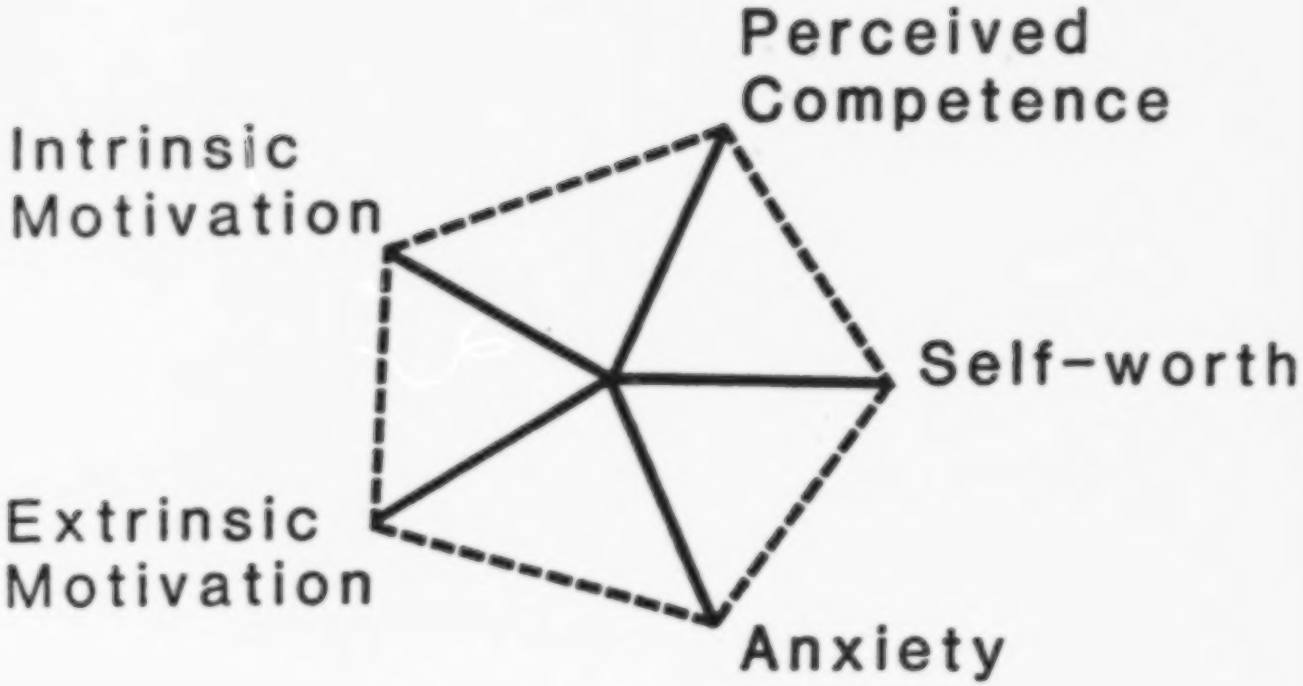
$p < .05$

TABLE 2

Means scores on self-perception measures for student typologies

Student Type	*Self-Worth	*Intrinsic Motivation	Extrinsic Motivation	*Anxiety
High-Performance High-Perceived Competence	3.42	4.17	3.32	8.40
High-Performance Low-Perceived Competence	2.74	3.13	3.33	13.33
Low-Performance High-Perceived Competence	3.47	3.03	3.17	9.17
Low-Performance Low-Perceived Competence	2.30	4.12	4.28	13.00
Average-Performance Average-Perceived Competence	2.82	3.04	3.69	12.18

*p < .05



THE STAR SYMBOL PLOT

Figure 1

HIGH PERFORMANCE

HIGH PERCEIVED COMPETENCE

Lisa

Mark

Lonna

Anthony

Albert

Jared

Josip

Reem

Jill

Brian

Sam

Warnr

Paul

HIGH PERCEIVED COMPETENCE

Brian

Bobby

Noel

Kari

Joel

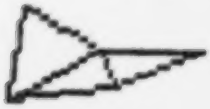
Sean

Tim

Kristin

Ryan

Royln



Manuel

LOW PERFORMANCE

LOW PERCEIVED COMPETENCE